IN THE CLAIMS

1. (Currently Amended) An electrochemical device comprising:

a fuel electrode which becomes a negative electrode while accompanying generation of hydrogen;

an oxygen electrode provided so as to be allowed to be in contact with oxygen, which becomes a positive electrode while accompanying generation of water from oxygen molecules, the hydrogen ions, and electrons;

an ion exchange membrane for conducting the hydrogen ions in said fuel electrode into said oxygen electrode, said ion exchange membrane having a proton conductor comprising a polymer material; and

a fuel source for supplying a fuel so as to generate the hydrogen ions in said fuel electrodes;

wherein,

said ion exchange member also comprises a carbon cluster derivative including a plurality of functional groups so as to be capable of transferring a plurality of protons between each of the functional groups of the carbon cluster derivative;

said fuel electrode and said fuel source constitute a fuel electrode assembly in a state being in contact with each other;

said fuel electrode assembly is surrounded by said ion exchange membrane in a state being in contact with said ion exchange membrane; and

said ion exchange membrane is surrounded by said oxygen electrode in a state being in contact with said oxygen electrode, wherein said fuel source is made from carbon-based fluorine molecules, carbon nanotubes, or carbon nanofibers.

2. (Original) An electrochemical device according to claim 1, wherein said fuel source is allowed to absorb a liquid fuel or hydrogen gas.

3. (Original) An electrochemical device according to claim 2, wherein said fuel source is composed of a hydrogen absorber made from carbon based fullerene molecules, carbon nanotubes, carbon nanofibers, or a metal hydride.

4. (Original) An electrochemical device according to claim 1, wherein said fuel electrode assembly is formed into a round column shape; and

each of said ion exchange membrane and said oxygen electrode is formed into a hollow cylinder shape.

5. (Original) An electrochemical device according to claim 4, wherein said fuel source is formed into a round column shape and said fuel electrode is formed into a hollow cylinder shape, and said fuel source is surrounded by said fuel electrode in a state being in contact with said fuel electrode.

6. (Original) An electrochemical device according to claim 1, wherein said ion exchange membrane has a porous matrix which is filled with said proton conductor.

7. (Original) An electrochemical device according to claim 1, wherein said ion exchange membrane is formed by mixing said proton conductor with a binder and forming the mixture into a film shape.

8. (Original) An electrochemical device according to claim 1, wherein said proton conductor is formed by introducing proton dissociative groups in a base body composed of a carbonaceous material containing carbon as a main component.

9. (Original) An electrochemical device according to claim 1, wherein said proton conductor is formed of an electrolyte membrane which does not require water management.

10. (Original) An electrochemical device according to claim 9, wherein said electrolyte membrane is a self-humidifying type solid polymer membrane.

11. (Original) An electrochemical device according to claim 9, wherein said electrolyte membrane is made from a proton conductive inorganic compound.

12. (Previously Presented) A power generator having a plurality of electrochemical devices, each of said electrochemical devices comprising:

a fuel electrode which becomes a negative electrode while accompanying generation of hydrogen;

an oxygen electrode provided so as to be allowed to be in contact with oxygen, which becomes a positive electrode while accompanying generation of water from oxygen molecules, the hydrogen ions, and electrons;

an ion exchange membrane for conducting the hydrogen ions in said fuel electrode into said oxygen electrode, said ion exchange membrane having a proton conductor comprising a polymer material; and

a fuel source for supplying a fuel so as to generate the hydrogen ions in said fuel electrodes;

wherein,

said plurality of electrochemical devices are electrically connected to each other by means of a conductive connection pattern;

said fuel electrode and said fuel source in at least one of said electrochemical devices constitute a fuel electrode assembly in a state being in contact with each other;

said fuel electrode assembly in at least one of said electrochemical devices is surrounded by said ion exchange membrane in a state being in contact with said ion exchange membrane;

said ion exchange membrane in at least one of said electrochemical devices is surrounded by said oxygen electrode in a state being in contact with said oxygen electrode; and

said ion exchange member also comprises a carbon cluster derivative including a plurality of functional groups so as to be capable of transferring a plurality of protons between each of the functional groups of the carbon cluster derivative.

13. (Previously Presented) A power generation system having a plurality of electrochemical devices, each of said electrochemical devices comprising:

a fuel electrode which becomes a negative electrode while accompanying generation of hydrogen;

an oxygen electrode provided so as to be allowed to be in contact with oxygen, which becomes a positive electrode while accompanying generation of water from oxygen molecules, the hydrogen ions, and electrons;

an ion exchange membrane for conducting the hydrogen ions in said fuel electrode into said oxygen electrode, said ion exchange membrane having a proton conductor comprising a polymer material; and

a fuel source for supplying a fuel so as to generate the hydrogen ions in said fuel electrodes;

wherein,

said plurality of electrochemical devices are electrically connected to each other by means of a conductive connection pattern;

said ion exchange member also comprises a carbon cluster derivative including a plurality of functional groups so as to be capable of transferring a plurality of protons between each of the functional groups of the carbon cluster derivative

said plurality of electrochemical devices and said conductive connection pattern are disposed in a housing; and

said fuel electrode and said fuel source in at least one of said electrochemical devices constitute a fuel electrode assembly in a state being in contact with each other;

said fuel electrode assembly in at least one of said electrochemical devices is surrounded by said ion exchange membrane in a state being in contact with said ion exchange membrane; and

said ion exchange membrane in at least one of said electrochemical devices is surrounded by said oxygen electrode in a state being in contact with said oxygen electrode.

14. (Original) A power generation system according to claim 13, wherein said housing is provided with an oxygen supply passage or an air supply passage for supplying oxygen or air to said electrochemical devices, and a fuel filling port for supplying a fuel to said fuel sources.

15. (Previously Presented) An electrochemical device comprising:

a fuel electrode which becomes a negative electrode while accompanying generation of hydrogen;

an oxygen electrode provided so as to be allowed to be in contact with oxygen, which becomes a positive electrode while accompanying generation of water from oxygen molecules, the hydrogen ions, and electrons;

an ion exchange membrane for conducting the hydrogen ions in said fuel electrode into said oxygen electrode, said ion exchange membrane having a proton conductor comprising a polymer material; and

a fuel source for supplying a fuel so as to generate the hydrogen ions in said fuel electrodes;

wherein,

said ion exchange member also comprises a carbon cluster derivative including a plurality of functional groups so as to be capable of transferring a plurality of protons between each of the functional groups of the carbon cluster derivative;

said oxygen electrode is surrounded by said ion exchange membrane in a state being in contact with said ion exchange membrane;

said ion exchange membrane is surrounded by said fuel electrode in a state being in contact with said fuel electrode;

said fuel electrode and said fuel source constitute a fuel electrode assembly in a state being in contact with each other; and

said fuel electrode assembly surrounding said oxygen electrode acts only on said oxygen electrode.

16. (Original) An electrochemical device according to claim 15, wherein said fuel source is allowed to absorb a liquid fuel or hydrogen gas.

17. (Original) An electrochemical device according to claim 16, wherein said fuel source is composed of a hydrogen absorber made from carbon based fullerene molecules, carbon nanotubes, carbon nanofibers, or a metal hydride.

18. (Original) An electrochemical device according to claim 15, wherein each of said fuel electrode assembly, said ion exchange membrane, and said oxygen electrode is formed into a hollow cylinder shape.

19. (Original) An electrochemical device according to claim 15, wherein each of said fuel source and said fuel electrode is formed into a hollow cylinder shape, and said fuel electrode is surrounded by said fuel source in a state being in contact with said fuel source.

20. (Original) An electrochemical device according to claim 15, wherein said ion exchange membrane has a porous matrix which is filled with said proton conductor.

21. (Original) An electrochemical device according to claim 15, wherein said ion exchange membrane is formed by mixing said proton conductor with a binder and forming the mixture into a film shape.

22. (Original) An electrochemical device according to claim 1, wherein said proton conductor is formed by introducing proton dissociative groups in a base body composed of a carbonaceous material containing carbon as a main component.

23. (Original) An electrochemical device according to claim 15, wherein said proton conductor is formed of an electrolyte membrane which does not require water management.

24. (Original) An electrochemical device according to claim 23, wherein said electrolyte membrane is a self-humidifying type solid polymer membrane.

25. (Original) An electrochemical device according to claim 23, wherein said electrolyte membrane is made from a proton conductive inorganic compound.

26. (Previously Presented) A power generator having a plurality of electrochemical devices, each of said electrochemical devices comprising:

a fuel electrode which becomes a negative electrode while accompanying generation of hydrogen;

an oxygen electrode provided so as to be allowed to be in contact with oxygen, which becomes a positive electrode while accompanying generation of water from oxygen molecules, the hydrogen ions, and electrons;

an ion exchange membrane for conducting the hydrogen ions in said fuel electrode into said oxygen electrode, said ion exchange membrane having a proton conductor comprising a polymer material; and

a fuel source for supplying a fuel so as to generate the hydrogen ions in said fuel electrodes;

wherein,

said oxygen electrode in at least one of said plurality of electrochemical devices is surrounded by said ion exchange membrane in a state being in contact with said ion exchange membrane; and

said ion exchange membrane in at least one of said plurality of electrochemical devices is surrounded by said fuel electrode in a state being in contact with said fuel electrode;

said ion exchange member also comprises a carbon cluster derivative including a plurality of functinal groups so as to be capable of transferring a plurality of protons between each of the functional groups of the carbon cluster derivative;

said fuel electrode and said fuel source in at least one of said electrochemical devices constitute a fuel electrode assembly in a state being in contact with each other;

said plurality of electrochemical devices are electrically connected to each other by means of a conductive connection pattern; and

said fuel electrode assembly surrounding one of said oxygen electrodes acts only on said one of said oxygen electrodes.

27. (Previously Presented) A power generation system having a plurality of electrochemical devices, each of said electrochemical devices comprising:

a fuel electrode which becomes a negative electrode while accompanying generation of hydrogen;

an oxygen electrode provided so as to be allowed to be in contact with oxygen, which becomes a positive electrode while accompanying generation of water from oxygen molecules, the hydrogen ions, and electrons;

an ion exchange membrane for conducting the hydrogen ions in said fuel electrode into said oxygen electrode, said ion exchange membrane having a proton conductor comprising a polymer material; and

a fuel source for supplying a fuel so as to generate the hydrogen ions in said fuel electrodes;

wherein,

said oxygen electrode in at least one of said plurality of electrochemical devices is surrounded by said ion exchange membrane in a state being in contact with said ion exchange membrane;

said ion exchange membrane in at least one of said plurality of electrochemical devices is surrounded by said fuel electrode in a state being in contact with said fuel electrode;

said ion exchange member also comprises a carbon cluster derivative including a plurality of functinal groups so as to be capable of transferring a plurality of protons between each of the functional groups of the carbon cluster derivative

said fuel electrode and said fuel source in at least one of said electrochemical devices constitute a fuel electrode assembly in a state being in contact with each other;

said plurality of electrochemical devices are electrically connected to each other by means of a conductive connection pattern;

said fuel electrode assembly surrounding one of said oxygen electrodes acts only on said one of said oxygen electrodes; and

said plurality of electrochemical devices and said conductive connection pattern are disposed in a housing.

28. (Original) A power generation system according to claim 27, wherein said housing is provided with an oxygen supply passage or an air supply passage for supplying oxygen or air to said electrochemical devices, and a fuel filling port for supplying a fuel to said fuel sources.

29. (New) An electrochemical device according to claim 1, wherein said fuel electrode comprises a carbon particle layer in which a platinum catalyst is supported.

30. (New) An electrochemical device according to claim 29, wherein the carbon particle layer is impregnated with a proton conductor.

31. (New) An electrochemical device according to claim 30, wherein the proton conductor is formed by introducing proton dissociative groups in a base body composed of a carbonaceous material containing carbon as a main component.

32. (New) An electrochemical device according to claim 31, wherein the proton conductor comprises a fullerene derivative based proton conductor.